

REMARKS

Claim 1 has been amended to clarify the claim. The scope has not changed. Claims 55-60 have been canceled, without prejudice. Claims 61-66 are newly added. Claims 1-54 and 61-66 are pending in the application. Applicants reserve the right to pursue the original claims and other claims in this and other applications.

Claims 1-4, 6, 27, 29-33, 35-41, 46, 48-52, and 54 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 1,329,432 (“Tsunetomo”).

The Supreme Court recently held in *KSR Int'l Co. v. Teleflex Inc.* that “the [*Graham*] factors continue to define the inquiry that controls a finding of obviousness.” 550 U.S. ___, 82 USPQ2d 1385, 1397 (2007). The *Graham* factors include determining the scope and content of the prior art, ascertaining differences between the prior art and the claims at issue, and resolving the level of ordinary skill in the pertinent art. *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966). Applicant submits that the Office Action has not shown that the claims would have been obvious by conducting a full examination of the *Graham* factors. Specifically, the Office Action has not explicitly or implicitly resolved the level of ordinary skill in the pertinent art. “Patent examiners carry the responsibility of making sure that the standard of patentability enunciated by the Supreme Court and by the Congress is applied in each and every case.” *MPEP* 2141.

Claim 1 recites “forming a first opening in the first layer using a first etchant; [and] providing a second etchant in the first opening to etch both the substrate and the first layer to form a first mold for the micro-lens.” The Office Action acknowledges that Tsunetomo does not disclose this limitation. (Office Action, page 3). The Office Action states that it would have been obvious to use two etchants in the process of Tsunetomo to “maximize the efficiency of the process” by “select[ing] an etchant for the first step that would provide the fastest etch rate of the first layer.” (Office Action, page 3). Applicant respectfully disagrees with this statement as discussed in greater detail below.

In *KSR*, the Supreme Court stated that “[r]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at ___, 82 USPQ2d at 1396. As described in the Federal Register/Vol. 72, No. 195/Wednesday, October 10, 2007 Notices, page 57534, one rationale that may be used to show that a claim would be obvious is to show some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. This is the rationale that the Office Action provides to hold that claims 1-4, 6, 27, 29-33, 35-41, 46, 48-52, and 54 are obvious over Tsunetomo. To reject a claim based on this rationale, the Office Action must articulate the following: “(1) a finding that there was some teaching, suggestion, or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) a finding that there was reasonable expectation of success; and (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.” *Id.*

In the case at hand, the Office Action has failed to make a *prima facie* case for obviousness at least because the Office Action has failed to articulate the findings necessary to maintain a finding of obviousness under the Office Action’s chosen rationale. Specifically, the Office Action has at least failed to articulate a finding that there was a reasonable expectation of success of modifying Tsunetomo. Applicants respectfully submit that, in fact, there was not reasonable expectation of success for modifying Tsunetomo, as discussed below. Therefore, the rejection of claim 1 is improper.

Applicant respectfully submits that the Office Action has erred in the factual findings and that the conclusion of obviousness is therefore incorrect. Firstly, the Office Action states that one of ordinary skill in the art would have been motivated to use two etchants in the process of Tsunetomo by “select[ing] an etchant for the first step that would provide the fastest etch rate of the first layer” to “maximize the efficiency of the process.” (Office Action, page 3). Applicant respectfully

submits that using two etchants instead of one etchant as taught by Tsunetomo would actually result in a slower, less efficient process for the reasons discussed below.

Tsunetomo teaches that the shape of the concave mold is determined by the thickness of the fluoridated SiO_2 layer 28 and the etching rate of the fluoridated SiO_2 28 layer versus that of the additive-free SiO_2 layer 26. (Tsunetomo, paragraph [0047]; FIGS. 8). Therefore, the fluoridated SiO_2 layer 28 and the additive-free SiO_2 layer 26 must be etched with the same specifically formulated etchant to create a concave mold having a non-spherical shape. The Office Action states that, in the process of Tsunetomo, it would be obvious to etch only the fluoridated SiO_2 layer 28 with a first "fastest" etchant, presumably the portion shown in FIG. 8C, and then to switch to a second etchant to etch the fluoridated SiO_2 layer 28 and the additive-free SiO_2 layer 26, presumably the portions shown in FIG. 8D. Applicants respectfully submit that such a switch would in actual practice be less efficient and more time consuming than using one etchant. Firstly, using two etchants would add additional overall cost to procure two separate etchants for the process. Secondly, switching from a first etchant to a second etchant would require the process to be stopped to switch from one etchant to another, thus making the process less efficient. Thirdly, and most importantly, the first etchant would need to be completely removed from the cavity shown in FIG. 8C through the 5 μm opening in the Cr layer 30 before the second etchant was added so that the second etchant would not be mixed with the first etchant and result in an etchant having a variable concentration of components, which in turn would result in variable depths and shapes among cavities. Even assuming, *arguendo*, that it is possible to remove all of the first etchant through the 5 μm opening in the Cr layer 30, which is doubtful, it would certainly require more time and expense than would be saved by the increased etch rate of the fluoridated SiO_2 layer 28 alone. This is one reason why the Office Action's conclusion of obviousness is incorrect.

Furthermore, there is no reasonable expectation of success that a first etchant could actually be completely removed through the 5 μm opening in the Cr layer 30 and replaced with a second etchant in the method of Tsunetomo. Because there is no reasonable expectation of success, the Office Action has failed to provide a rationale to show that the claims would be obvious over Tsunetomo. This is a further reason why the Office Action's conclusion of obviousness is incorrect.

As discussed above, the Office Action is factually incorrect on a number of issues relating to Tsunetomo and is incorrect on the conclusion of obviousness with regard to claim 1. Claim 38 is similar to claim 1 and is allowable for the same reasons. Claims 2-4, 6, 27, 29-31 depend from claim 1 and are patentable at least for the reasons mentioned above. Claims 33, 35-41, 46, 48-52, and 54 depend from claim 38 and are patentable at least for the reasons mentioned above. Applicant respectfully requests that the rejection be withdrawn and the claims allowed.

Claim 2 recites that “the second etchant is a wet etchant and the first etchant is a dry etchant.” Tsunetomo does not teach or suggest this limitation. Further, the Office Action has not provided a rationale as to how this limitation would be obvious in view of Tsunetomo. Applicant respectfully request that claim 2 be allowed. Claim 39 is similar to claim 2 and is allowable for the same reasons.

Claim 3 recites “etching the first layer to extend the openings to the substrate; and removing the resist material.” Tsunetomo does not teach or suggest this limitation. To the contrary, Tsunetomo teaches etching the fluoridated SiO₂ layer 28 and the additive-free SiO₂ layer 26 before removing the Cr layer 30 (FIGS. 8D and 8E) and does not teach “etching the first layer to extend the openings to the substrate; and removing the resist material” as recited by claim 3. (emphasis added). Applicant respectfully request that claim 3 be allowed. Claim 40 is similar to claim 2 and is allowable for the same reasons.

Claim 4 recites “etching the first layer to extend the openings to the substrate comprises conducting a dry etch.” Tsunetomo does not teach or suggest this limitation. Further, the Office Action has not provided a rationale as to how this limitation would be obvious in view of Tsunetomo. Applicant respectfully request that claim 4 be allowed. Claim 40 is similar to claim 4 and is allowable for the same reasons.

Claim 5 recites “the first layer is a layer of Silane PECVD, the substrate is TEOS PECVD densified, and the etchant is about ten percent hydrogen fluoride by volume in distilled water” and claim 41 recites “the first layer is a layer of Silane PECVD, the at least one second layer is a layer

of borophosphosilicate glass (3.8/6.9) WJ RTP and anneal, the substrate is TEOS PECVD densified, and the etchant is about ten percent hydrogen fluoride by volume in distilled water.” The Office Action acknowledges that Tsunetomo does not teach this limitation. (Office Action, page 3). The Office Action states that it would be obvious to one skilled in the art to appropriately change and optimize the composition of Tsunetomo’s various layers so that the various etching rates would produce a mold having the desired shape and cites paragraph [0020] of Applicant’s specification as evidence. Applicant respectfully disagrees. Paragraph [0020] only states that “that way in which a material is formed can affect the rate at which a particular etchant will etch the material” is known in the art. (Specification, [0020], emphasis added). The Office Action has improperly extrapolated from this statement that it would be obvious to substitute the specific materials and etchants recited in claims 5 and 41. This statement is a mere conclusory statement and does not conform to any of the appropriate rationales enumerated by the Federal Register/Vol. 72, No. 195/Wednesday, October 10, 2007 Notices, page 57529.

Claims 34 and 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsunetomo in view of U.S. Patent No. 5,708,493 (“Ahsbabs”). This rejection is respectfully traversed. Claims 34 and 53 depend from claim 38, which is allowable over Tsunetomo at least for the reasons discussed above. Furthermore, Ahsbabs does not cure the deficiencies of Tsunetomo. Applicant respectfully requests that the rejection be withdrawn and the claims allowed.

Newly added claim 61 recites “forming a first opening in the first layer using a first etchant, the first opening having sidewalls substantially perpendicular to the surface of the first layer.” Tsunetomo does not teach or suggest this limitation. To the contrary, Tsunetomo recites that “[t]he surface obtained by etching, however, comes close to a spherical surface because the silica glass is etched isotropically.” (Tsunetomo, paragraph [0028]). Therefore, because Tsunetomo only teaches isotropic etchants, which etch in a horizontal and vertical direction, Tsunetomo does not teach a “first opening having sidewalls substantially perpendicular to the surface of the first layer” as recited by claim 61.

In view of the above, Applicant believes the pending application is in condition for allowance.

Dated: October 17, 2007

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